In the Specification

Kindly replace the paragraphs on page 1 with the following:

Technical Field ~~of the Invention~~

~~The present invention relates to~~ We provide an improvement of a method of Resin Transfer Molding (hereinafter, referred to as "RTM") for molding a structural material of a fiber reinforced plastic (hereinafter, referred to as "FRP"), and specifically, to a method of RTM molding in which it is possible to mold a thick material, and further, it is possible to improve a quality of surface property or to increase a fiber volume content (hereinafter, also referred to as "Vf") of an FRP molded material to be molded. Although the title ~~of the present invention is referred~~ refers to ~~as~~ a "method of RTM molding" ~~in this specification~~, the technical concept ~~according to the present invention~~ here includes ~~this~~ both a molding method ~~due to~~ for RTM itself and a method for producing an FRP molded material using the molding method.

Background ~~Art of the Invention~~

Although FRP has been used in various fields, as a method for producing an FRP structural material, general is a so-called prepreg/autoclave molding method wherein, after a preform having a shape of a structural material to be molded is formed beforehand by prepregs, the preform is cured in an autoclave set at a predetermined condition in temperature and pressure. However, recently a method of RTM molding is paid attention to in order to reduce the production cost, and this method is developed gradually. Many methods are proposed as RTM molding methods for producing panels and beam materials which are structural members for air planes or architecture requiring high strength, lightweight and low cost or for producing FRP molded products such as outer panels of vehicles. For example, there are a method of RTM molding for molding a large FRP structural material (for example, JP-A 12-145042) and a [[a]] method of RTM molding using a resin distribution medium (for example, U.S. Patent 5,052,906).

Kindly replace the second full paragraph on page 6 and subsequent paragraphs through to mid page 8 with the following:

~~Disclosure of the Invention~~ Summary

Accordingly, ~~an object of the present invention is to~~ we provide a method of RTM molding (method for producing an FRP) which can solve the above-described various problems in the

conventional methods, which can mold even a thick FRP structural material with a good resin impregnation property, and which can realize improvement of the surface quality, increase of the lightweight property and achievement of an excellent strength.

To accomplish the above object, a method of RTM molding ~~according to the present invention~~ wherein a reinforcing fiber substrate is placed in a mold, resin distribution media each exhibiting a resin flow resistance lower than a resin flow resistance of the reinforcing fiber substrate are placed on both surfaces of the reinforcing fiber substrate, and after a pressure in the mold is reduced by evacuation, a resin is injected into the mold through the resin distribution media to impregnate the reinforcing fiber substrate with the resin injected, is characterized in that a resin flow resistance of a first resin distribution medium placed on a first surface of the reinforcing fiber substrate is set lower than a resin flow resistance of a second resin distribution medium placed on a second surface of the reinforcing fiber substrate, and the evacuation is carried out through the second resin distribution medium while the resin is injected into the first resin distribution medium to impregnate the reinforcing fiber substrate with the resin injected (a first method) is provided.

Namely, in ~~the~~ our method of RTM molding ~~according to the present invention~~, an intentional large/small relationship is given to the resin flow resistances of the resin distribution media placed on both surfaces of the reinforcing fiber substrate. In practice, the resin flow resistance can be determined by measuring a gas permeation resistance and determining it as a value corresponding to the measured gas permeation resistance. Alternatively, because the permeability generally shown bu the following equation has the same meaning as that of the resin flow resistance, such a value may be employed.

$L = \sqrt{(2\beta PK \, x \int [dt \, \sqrt{(\mu(t)t)}]}$

L: impregnation distance (m)

K: permeability (m^2)

β: constant

P: vacuum pressure in substrate (kg/m^2)

$\mu(t)$: viscosity ($kg \cdot s/m^2$)

t: expiration time

~~In the present invention, although~~ Although the reinforcing fiber substrate may be a single layer or may be formed as a laminate of a plurality of reinforcing fiber materials, because ~~the~~ our

method of RTM molding ~~according to the present invention~~ is suitable particularly for molding of a thick product, namely, for molding for impregnating a resin into a thick reinforcing fiber substrate, ~~the~~ our target ~~of the present invention~~ is mainly a case where a reinforcing fiber substrate comprising a laminate of a plurality of reinforcing fiber materials is used.

In this method of RTM molding ~~according to the present invention~~, it is preferred that the resin flow resistance of the above-described second resin distribution medium is set lower than the resin flow resistance of the above-described reinforcing fiber substrate. By this, because the resin flow resistance (gas permeation resistance) of the second resin distribution medium is suppressed sufficiently low as compared with the resin flow resistance (gas permeation resistance) of the reinforcing fiber substrate although the resin flow resistance (gas permeation resistance) of the second resin distribution medium is higher than the resin flow resistance (gas permeation resistance) of the first resin distribution medium, the reduction of the vacuum degree in the substrate due to deterioration of gas permeation from the reinforcing fiber substrate is suppressed, and damage to the resin impregnation into a thick reinforcing fiber substrate can be avoided.

Kindly replace the first full paragraph on page 9 and the subsequent paragraphs through to the bottom of page 10 with the following:

Further, in ~~the~~ our method of RTM molding ~~according to the present invention~~, it is preferred that a peel ply capable of being removed together with a resin distribution medium after molding is interposed between at least one resin distribution medium and the reinforcing fiber substrate. By this, the resin distribution medium can be easily delaminated. However, after releasing the molded product from the mold, at least one resin distribution medium may be left in the molded product without delaminating it from the molded product. In this case, the peel ply is not necessary for the side where the resin distribution medium is left.

Further, in ~~the~~ our method of RTM molding ~~according to the present invention~~, a method may be employed wherein a porous sheet is interposed between at least one resin distribution medium and the reinforcing fiber substrate. This porous sheet has a function different from that of the above-described peel ply, and it is a sheet for suppressing a transfer of the irregularity of the resin distribution medium to the reinforcing fiber substrate side while maintaining the resin distribution

function of the resin distribution medium. Therefore, the sheet is preferably disposed on the design surface side of the molded product.

Further, in ~~the~~ our method of RTM molding ~~according to the present invention~~, at least one resin distribution medium may be formed by providing a groove as a resin flow path on an inner surface of the mold. In this case, even if a separate resin distribution medium is not made, it is possible to use the inner surface of the mold itself as a resin distribution medium.

Further, in ~~the~~ our method of RTM molding ~~according to the present invention~~, it is preferred that injection of a resin is started also through the second resin distribution medium before the above-described resin reaches the above-described second surface. Namely, from this time, the resin impregnation from both surfaces is substantially started.

Further, in ~~the~~ our method of RTM molding ~~according to the present invention~~, a method can be employed wherein, in a case where at least two resin injection gates are disposed above the first resin distribution medium, the resin injection is carried out simultaneously from at least two resin injection gates adjacent to each other, or from all resin injection gates. Since the evacuation through the second resin distribution medium as well as the resin injection are carried out simultaneously while the quick resin impregnation is achieved, the generation of resin non-impregnation portions can be prevented.

Further, ~~the present invention the~~ our following method of RTM molding from the viewpoint of molding particularly an excellent design surface. Namely, a method of RTM molding ~~according to the present invention~~ is characterized in that a reinforcing fiber substrate is placed in a mold, a resin distribution medium exhibiting a resin flow resistance lower than a resin flow resistance of the reinforcing fiber substrate is placed on a surface of the reinforcing fiber substrate opposite to the mold, a degasification medium comprising a gas permeation film and a gas permeable substrate is provided between the reinforcing fiber substrate and the mold, a resin is injected into the mold through the resin distribution medium after a pressure in the mold is reduced by evacuation, and the resin injected is impregnated into the reinforcing fiber substrate by evacuating the resin injected from a degasification space formed between the gas permeation film and the mold (a second method).

Kindly replace the third full paragraph on page 11 and the paragraph spanning pages 11 and 12 with the following:

Furthermore, in the above-described second method, particularly in a case where a product with a wide area is molded, it is also preferred that at least one evacuation route is provided in the mold in addition to an evacuation route from the ~~degasifie ation~~ degasification space formed between the gas permeation film and the mold.

In the above-described method of RTM molding ~~according to the present invention~~ (the first method), the resin is injected into the first resin distribution medium having a lower resin flow resistance, and the injected resin is quickly impregnated into the reinforcing fiber substrate in the thickness direction while the resin is distributed quickly and broadly in a direction along the first surface of the reinforcing fiber substrate. Then, basically the inside of the mold is reduced in pressure by evacuation via the second resin distribution medium having a higher resin flow resistance, and the above-described injected resin is impregnated into the reinforcing fiber substrate having an evacuated and pressure-reduced condition. At that time, since the resin flow resistance (gas permeation resistance) of the second resin distribution medium is suppressed sufficiently low as compared with the resin flow resistance (gas permeation resistance) of the reinforcing fiber substrate although it is higher than the resin flow resistance (gas permeation resistance) of the first resin distribution medium, it is suppressed to reduce the vacuum degree in the substrate by deterioration of gas permeation from the reinforcing fiber substrate, and a quick resin impregnation can be ensured. Therefore, even for a thick reinforcing fiber substrate, a sufficiently good resin impregnation can be ensured. Since the resin flow resistance (gas permeation resistance) of the second resin distribution medium is set higher than that of the first resin distribution medium, the second resin distribution medium can be formed as a medium with a small irregularity as compared with the first resin distribution medium, and even if a transfer of the surface form of this second resin distribution medium to the surface of a molded product occurs, the degree of the irregularity on the surface of the molded product ascribed to the transfer can be suppressed small. Therefore, by setting this surface side to be a design surface side, a desirable design surface of the molded product having a small irregularity can be obtained.

Kindly replace the paragraph spanning pages 13 and 14 with the following:

Further, the aforementioned method of RTM molding ~~according to the present invention~~ (the second method) is effective for the following cases. ~~namely~~ Namely, in a case where a flatness of a

molded surface (a design surface) at the mold side is required further strongly, and in a molding where a resin impregnation into a thick and broad-area reinforcing fiber substrate is required, in particular, a degasification medium comprising a gas permeation film and a gas permeable substrate can be provided between the reinforcing fiber substrate and the surface of the mold as means for always effectively operating the degasification route from any portion of the mold surface. By this, at the time of resin injection, even if there is a difference in time for reaching of resin to the lower surface side (design surface forming side) of the reinforcing fiber substrate and a portion late in impregnation is liable to occur, by evacuation from the degasification formed between the gas permeation film and the mold, finally it becomes possible to completely impregnate the resin over the entire surface. Consequently, a design surface along the mold surface and good in flatness can be obtained.

Kindly replace the paragraph spanning pages 14 and 15 with the following:

Further, ~~the present invention~~ we also ~~provides~~ provide the following method of RTM molding from the viewpoint of high [[Vf]] V_f molding. Namely, the method of RTM molding ~~according to the present invention~~ wherein a reinforcing fiber substrate is placed in a mold, a resin injection line and an evacuation line each communicating with an inside of the mold are provided, a pressure in the mold is reduced by evacuation and a resin is injected into the mold and impregnated into the reinforcing fiber substrate to form an FRP molded material, is characterized in that, after the resin is impregnated into the reinforcing fiber substrate so as to achieve a fiber volume content lower than a target fiber volume content of the FRP molded material, the injection of resin is stopped, and thereafter, evacuation of resin is continued until reaching the target fiber volume content (a third method). Namely, when the resin is cured after the resin is flown over the entire area of the substrate and impregnated, before the resin is cured, the evacuation of resin is continued until reaching the target fiber volume content and excessive resin is evacuated from the inside of the reinforcing fiber substrate, thereby realizing a method of RTM molding capable of increasing the fiber volume content up to the target value.

Kindly replace the paragraph spanning pages 16 and 17 and the full paragraph on page 17 with the following:

In the above-described method of RTM molding ~~according to the present invention~~ (the third method), because first the resin is impregnated into the reinforcing fiber substrate so that the fiber volume content becomes lower than the target fiber volume content of the FRP molded material, the porosity is high, the resin is impregnated sufficiently over the entire area of the reinforcing fiber substrate, and at that time, generation of resin non-impregnated portions can be prevented. After this resin impregnation, the resin injection is stopped, and thereafter, by the time when the resin is cured, the evacuation of resin is continued until reaching the target fiber volume content, and excessive resin is evacuated from the inside of the reinforcing fiber substrate, thereby achieving a target high Vf of the molded material.

Further, ~~the present invention~~ we also ~~provides~~ provide the following method of RTM molding as another method for solving the aforementioned problems. Namely, the method of RTM molding according to the present invention is characterized in that a plurality of reinforcing fiber materials are laminated in a mold to form a reinforcing fiber material laminate, and a resin is impregnated into the reinforcing fiber material laminate by injecting a resin in a direction from an end surface of the reinforcing fiber material laminate along a laminate surface while reducing a pressure in the mold by evacuation (a fourth method). Namely, the resin is injected from the end surface of the reinforcing fiber material laminate mainly into a portion between layers of the reinforcing fiber materials, and the resin injected is impregnated into respective reinforcing fiber materials.

Kindly replace the paragraph spanning pages 19 and 20 with the following:

The sectional shape of the reinforcing fiber material laminate is not particularly restricted, and it may be a rectangular, C-type, I-type, L-type, Z-type, T-type, J-type or hat shape, other than a flat plate shape. Further, in a case of a reinforcing panel formed from a skin material (a skin plate material) and a stringer material (a beam material), the skin material is frequently formed in a simple flat plate shape but the stringer material is frequently formed in a relatively complicated shape, and in such a case, ~~the present invention~~ our disclosure is suitably applied particularly to the part for forming the stringer material. For example, in a case where the reinforcing fiber material laminate comprises a part for forming a stringer material having a section of a rectangular, C-type, I-type, L-type, Z-type, T-type, J-type or hat shape, and a part for forming a skin material, ~~the present invention~~

our disclosure is suitable particularly for molding of this part for forming the stringer material. Namely, in the method, after the resin is injected from the end surface of the part for forming the stringer material of the laminate mainly into portions between layers of the respective reinforcing fiber materials, the resin injected is impregnated into the entire part for forming the stringer material. Where, these part for forming the stringer material and part for forming the skin material may be molded integrally. Because the resin is injected from the end surface of the part for forming the stringer material, restriction in thickness of stringer material does not exist, and because it is not necessary to dispose a resin distribution medium, an improvement of surface property, and a great cost down due to saving of the preparing operation and the removing operation of the resin distribution medium, can be achieved. In this case, a method can be employed wherein, for the part for forming the skin material, the resin is impregnated in the thickness direction while distributed in the direction along the surface of the part for forming the skin material via a resin distribution medium, and a reinforcing panel formed from the skin material and the stringer material is molded integrally.

Kindly replace the paragraph spanning pages 20 and 21 and subsequent paragraphs through to the top of page 23 with the following:

Brief ~~explanation~~ description of the drawings

Fig. 1 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to a first embodiment of the present invention~~.

Fig. 2 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to a second embodiment of the present invention~~.

Fig. 3 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to a third embodiment of the present invention~~.

Fig. 4 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to a fourth embodiment of the present invention~~.

Fig. 5 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to a fifth embodiment of the present invention~~.

Fig. 6 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to a sixth embodiment of the present invention~~.

Fig. 7 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to a seventh embodiment of the present invention~~.

Fig. 8 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to an eighth embodiment of the present invention~~.

Fig. 9 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to a ninth embodiment of the present invention~~.

Fig. 10 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to a tenth embodiment of the present invention~~.

Fig. 11 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to an eleventh embodiment of the present invention~~.

[Explanation of symbols]

1: mold

2: breather

3, 3a, 3b: peel ply

4: reinforcing fiber substrate

4A, 4B, 4C, 4D: reinforcing fiber material laminate

4a, 4b: end surface of laminate

5, 5a, 5b: resin distribution medium

6, 6a, 6b, 6d, 6e, 6i, 6k, 6l: evacuation gate

6c, 6f, 6g, 6h, 6j, 6m, 6n, 6o: resin injection gate

7: sealant

8: bag material

9, 41, 42, A1, A2, A3, A4, A5, B1, B2: valve

10: matrix resin

11 vacuum pump

12: resin pot

13: vacuum trap

14: shape fixing jig

20: porous sheet

21: dial gauge

23: gas permeable material

30: mold groove for resin distribution

50: gas permeation film

51: gas permeable substrate

52: seal tape

53: degasification port

54: degasification medium

~~The Best mode for carrying out the Invention~~ Detailed Description

Hereinafter, ~~desirable embodiments of the present invention~~ we will ~~be explained~~ explain our disclosure referring to figures.

Fig. 1 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding ~~according to a first embodiment of the present invention~~. A mold 1 forming a base is made, for example, from a stainless steel or an aluminum alloy, or another metal for mold or an FRP, and formed in, for example, a flat-plate like shape. The shape of the mold 1 is processed depending on the shape of a desired molded product, and is not particularly restricted.

Kindly replace the paragraph spanning pages 23 and 24 with the following:

A reinforcing fiber substrate 4 is placed on peel ply 3a. In this embodiment, reinforcing fiber substrate 4 is formed as a laminate of a plurality of reinforcing fiber materials, in particular, a plurality of reinforcing fiber woven fabrics. ~~The present invention~~ Our disclosure is suitable particularly for the molding using such a thick reinforcing fiber substrate 4 laminated with a plurality of reinforcing fiber materials. However, even in a case where a reinforcing fiber substrate comprising a single reinforcing fiber material is used, of course, ~~the present invention~~ our disclosure can be applied, and also in such a case, ~~the present invention~~ our disclosure is suitable particularly for the molding using a thick reinforcing fiber substrate.

Kindly replace the full paragraph on page 27 with the following:

Fig. 2 is a schematic vertical sectional view of a molding apparatus according to a second embodiment of ~~the present invention~~ our disclosure, and Fig. 2 shows an embodiment wherein, instead of the breather, a resin distribution medium 5a and a porous sheet 20 are disposed on one

surface of the reinforcing fiber substrate. Fig. 3 is a schematic vertical sectional view of a molding apparatus according to a third embodiment of ~~the present invention~~ our disclosure, and Fig. 3 shows an embodiment wherein, instead of the resin distribution medium disposed on the surface of the mold in Fig. 2, the surface of the mold itself is formed as a resin distribution medium of the resin injection side by processing grooves on the mold. Hereinafter, only points different from the apparatus shown in Fig. 1 will be explained.

Kindly replace the first full paragraph on page 29 with the following:

Fig. 4 is a schematic vertical sectional view of a molding apparatus according to a fourth embodiment of ~~the present invention~~ our disclosure , and Fig. 4 shows an embodiment wherein two evacuation gates 6d, 6e for reducing the pressure are provided on the reinforcing fiber substrate shown in Fig. 3, and the resin is injected from both sides of the reinforcing fiber substrate by switching one gate 6d to a resin injection port on the way. Hereinafter, only points different from the apparatuses shown in Figs. 1-3 will be explained.

Kindly replace the first full paragraph on page 31 and the subsequent paragraph spanning pages 31 and 32 with the following:

Fig. 5 is a schematic vertical sectional view of a molding apparatus used for a method of RTM molding according to a fifth embodiment of ~~the present invention~~ our disclosure, and although the basic portions are the same as those in the aforementioned embodiments, it is different in that a degasification medium 54 comprising gas permeation film 50, gas permeable substrate 51 and seal tape 52 is provided on mold 1, and evacuation can be carried out from the degasification space formed between the gas permeation film 50 and the mold 1 through degasification port 53. Hereinafter, as to the molding method according to this embodiment, only points different from the aforementioned embodiments will be explained.

First, under a room temperature or a heated atmosphere, reinforcing fiber material laminate 4 is placed on the surface of mold 1 (tool), the whole of the materials and members including resin injection gate 6f disposed on the upper side and gas permeation film 50 and gas permeable substrate 51 disposed between mold 1 and laminate 4 is covered with bag material 8. In this case, all of the outer edge of gas permeation film 50 is sealed by ~~a dhering~~ adhering it to the mold surface with seal

tape 52. In this state, evacuation is carried out by vacuum pump 11, while the inside of bag material 8 is reduced in pressure by the evacuation through gas permeation film 50 and the degasification space, the resin is injected from resin injection gate 6f, and whereby, matrix resin 10 is distributed quickly in first resin distribution medium 5 in the direction along the upper surface of reinforcing fiber substrate 4 (a plane direction) and flows from the upper surface toward the lower surface of the reinforcing fiber substrate 4 and the resin is impregnated into the reinforcing fiber substrate 4. After the impregnation is finished, the resin is cured under a room temperature or a heated atmosphere, and thereafter, bag material 8 is delaminated and the molded material is released from the mold.

Kindly replace the paragraph spanning pages 33 and 34 with the following:

Fig. 7 shows an example of a molding apparatus used for a method of RTM molding according to a seventh embodiment of ~~the present invention~~ our disclosure. In Fig. 7, mold 1 forming a base is made, for example, from a stainless steel or an aluminum alloy, or another metal for mold or an FRP, and formed in, for example, a flat-plate like shape. Reinforcing fiber substrate 4 is placed in this mold 1, in the figure, on mold 1. Reinforcing fiber substrate 4 is formed, for example, as a laminate of a plurality of reinforcing fiber woven fabrics. In this embodiment, medium 5 for distributing a resin is placed on reinforcing fiber substrate 4 via peel ply 3. Resin distribution medium 5 preferably has a resin flow resistance of 1/10 or less of the resin flow resistance in reinforcing fiber substrate 4, and concretely, a mesh woven fabric made of polyethylene or polypropylene resin and having a mesh size of #400 or less is preferred. The whole of the materials thus disposed on mold 1 is covered with bag material 8 comprising a gas-tight material. As bag material 8, in consideration of gas-tight property and thermal resistance, for example, a nylon film is preferably used. Sealant 7 made of a synthetic rubber with a high adhesive property prevents the flowing in of air from outside so that a pressure-reduced condition of the inside of bag material 8 can be maintained. Where, if bag material 8 is formed as a double bag having a first bag material and a second bag material covering the first bag material, an air leakage can be prevented, and as a result, the [[Vf]] V_f can be increased.

Kindly replace the second full paragraph on page 35 with the following:

Fig. 8 shows a molding apparatus used for a method of RTM molding according to an eighth embodiment of ~~the present invention~~ our disclosure, and shows an apparatus wherein a substantial resin distribution medium is formed on the lower surface side of the reinforcing fiber substrate by processing grooves on the mold instead of disposing a resin distribution medium separately, and the thickness (thickness corresponding to the thickness of the molded material or the reinforcing fiber substrate impregnated with the resin) can be measured by a dial gauge during evacuation of resin. Point different from the apparatus shown in Fig. 7 are as follows.

Kindly replace the first full paragraph on page 37 with the following:

~~In the present invention, the~~ Our target fiber volume content Vf can be set, for example, by the following method.

Kindly replace the paragraph spanning pages 38 and 39 with the following:

Fig. 9 shows an example of a molding apparatus used for a method of RTM molding according to a ninth embodiment of ~~the present invention~~ our disclosure. In Fig. 9, mold 1 forming a base is made, for example, from a stainless steel or an aluminum alloy, or another metal for mold or an FRP, and formed in, for example, a flat-plate like shape. In a case where mold 1 is thus formed as a flat-plate like mold, although a concave-type cavity is not necessary, depending on the shape of a molded product to be molded, a concave-type cavity is formed in mold 1. Reinforcing fiber material laminate 4A is placed in this mold 1, in the figure, on mold 1. Reinforcing fiber material laminate 4A is formed as a laminate of a plurality of reinforcing fiber materials 4, and each reinforcing fiber material 4 comprises, for example, a reinforcing fiber woven fabric. Symbols 4a, 4b indicate the respective end surfaces of reinforcing fiber material laminate 4A formed in a thick flat plate-like shape. In this embodiment, relatively to these end surfaces 4a, 4b, resin distribution medium 5 for distributing a resin is disposed via peel ply 3. Where, peel ply 3 is disposed so as to cover the whole of reinforcing fiber material laminate 4A. This resin distribution medium 5 preferably has a low resin flow resistance of 1/10 or less of the resin flow resistance in reinforcing fiber material laminate 4A, and concretely, a mesh woven fabric made of polyethylene or polypropylene resin and having a mesh size of #400 or less is preferred. The whole of the materials thus disposed on mold 1 is covered with bag material 8 comprising a gas-tight material. As bag material 8, in consideration of

gas-tight property and thermal resistance, for example, a nylon film is preferably used. Sealant 7 made of a synthetic rubber with a high adhesive property prevents the flowing in of air from outside so that a pressure-reduced condition of the inside of bag material 8 can be maintained. Where, peel ply 3 is laid in order to easily remove resin distribution medium 5 and the like from a molded material, and as peel ply 3, for example, a woven fabric having a releasing function such as a nylon taffeta can be used.

Kindly replace the full paragraph on page 40 with the following:

Fig. 10 shows a molding apparatus used for a method of RTM molding according to a tenth embodiment of ~~the present invention~~ our disclosure, and shows an apparatus for molding a molded material with an integral composite formation comprising a stringer material with a composite shape, particularly, with an I-type cross section, and a flat plate-like skin material, as a fiber reinforced resin m olded material with a so-called skin/stringer integral structure. Point different from the apparatus shown in Fig. 9 are as follows.

Kindly replace the first full paragraph on page 41 and the subsequent paragraph spanning pages 41 and 42 with the following:

Fig. 11 shows a molding apparatus used for a method of RTM molding according to an eleventh embodiment of ~~the present invention~~ our disclosure, and shows an apparatus for molding a reinforcing fiber material laminate having a step. 4D is a reinforcing fiber material laminate disposed partially on the upper surface of the laminate of reinforcing fiber materials 4 similar to those shown in Fig. 9. The injected resin flows in resin distribution medium 5 disposed so as to extend up to one end surface of reinforcing fiber material laminate 4D, and the resin is permeated in the lamination direction (thickness direction) relatively to the thin plate portion (a portion where the laminate 4D is not laminated), and impregnated in the direction parallel to the lamination direction (namely, the direction toward the portions between layers) from the end surface of the reinforcing fiber material laminate 4D via the resin distribution medium 5 disposed on the surface perpendicular to the lamination direction relatively to the thick plate portion (a portion where the laminate 4D is laminated).

Next, ~~the~~ our method ~~according to the present invention~~ is carried out as follows, using the above-described respective apparatuses. The method will be explained with respect to the apparatus shown in Fig. 9, which shows a basic embodiment. First, a plurality of reinforcing fiber materials 4 are laminated on the molding surface of mold 1 to form reinforcing fiber material laminate 4A, and thereon, peel ply 3 for releasing (for example, nylon taffeta) is disposed so as to cover the whole of the laminate 4A. In this case, the outer edge of peel ply 3 is disposed so as to reach up to sealant 7, as shown in Fig. 9. Next, resin distribution medium 5 is disposed near both end portions of reinforcing fiber material laminate 4A so as to extend up to both end surfaces 4a, 4b of the laminate 4A, and further, thereon, resin injection port 6m and evacuation port 6k are disposed, respectively. Then, the whole of these materials is covered with bag material 8 (bag film), and the portion between the edge portion and mold 1 is sealed by sealant 7 over the entire circumference.

Kindly replace the first full paragraph on page 43 with the following:

Examples

Hereinafter, ~~the present invention~~ we will ~~be explained~~ explain based on examples.

Kindly replace the paragraph spanning pages 55 and 56 with the following:

Example 9

~~The present invention~~ Our disclosure was applied to the molding of a thick flat plate. In the apparatus shown in Fig. 9, a carbon fiber woven fabric 4 (reinforcing fiber material) cut at a length of 300 mm and a width of 300 mm was laid up on mold 1, comprising a stainless steel flat plate, by 128 plies, to form reinforcing fiber material laminate 4A having a total thickness of about 25 mm. Where, the used reinforcing fiber material was a unidirectional woven fabric CZ8431DP (weight: 190 g/m^2) of "TORAYCA" T800S produced by Toray Industries, Inc. Further, peel ply 3 (nylon taffeta) was disposed on reinforcing fiber material laminate 4A, resin distribution medium 5 (polypropylene mesh material) were disposed relatively to both end surfaces 4a, 4b of the laminate 4A, resin injection port 6m and evacuation port 6k were disposed so as to communicate with both ends of the laminate 4A, the whole of these members was covered with bag material 8 (nylon film) (by a double bag system, although omitted in the figure) and the circumferential portion was sealed by sealant 7 made of a synthetic rubber having a high adhesive property.

Kindly replace the paragraph spanning pages 56 and 57 with the following:

Example 10

~~The present invention~~ Our disclosure was applied to the molding of a skin/stringer integrally structural material. In the apparatus shown in Fig. 10, a carbon fiber woven fabric 4 (reinforcing fiber material) cut at a length of 500 mm and a width of 500 mm was laid up on mold 1 to form reinforcing fiber material laminate 4B. Where, the used reinforcing fiber material was a unidirectional woven fabric (weight: 190 g/m^2) of "TORAYCA" T800S produced by Toray Industries, Inc., and it was laminated by 128 plies totally (hereinafter, referred to as "reinforcing fiber material laminate for forming a skin material 4B"). Next, a carbon fiber woven fabric 4 cut at a width of 98 mm and a length of 500 mm was placed by 32 plies using jig 14 for fixing a C-type shape. Another laminate of the carbon fiber woven fabric 4 was further prepared, and the two laminates were disposed so as to form a structure back to back symmetrically with jigs 14 disposed at both sides to form a reinforcing fiber material laminate having an I-type cross section, and it was placed on the reinforcing fiber material laminate for forming a skin material 4B which had been already l aid up. Then, on the I-type reinforcing fiber material laminate, a carbon fiber woven fabric 4 cut at a width of 66 mm and a length of 500 mm was laid up by 32 plies (hereinafter, the reinforcing fiber material laminate placed on the reinforcing fiber material laminate for forming a skin material 4B is referred to as "reinforcing fiber material laminate for forming a stringer material 4C").

Kindly replace the paragraph spanning pages 58 and 59 with the following:

Example 11

~~The present invention~~ Our disclosure was applied to the molding of a panel with a step. In the apparatus shown in Fig. 11, a carbon fiber woven fabric 4 (produced by Toray Industries, Inc., plain weave fabric CO6343 using carbon fibers T300, weight: 190 g/m^2) cut at a length of 500 mm and a width of 500 mm was laid up by 24 plies on mold 1 of an aluminum flat plate, and thereon, the carbon fiber woven fabric cut at a length of 150 mm and a width of 500 mm was laid up by 56 plies was laid up as a thick plate portion, to form reinforcing fiber material laminate 4D. As shown in Fig. 11, on the whole of the reinforcing fiber material laminate, peel ply 3 (nylon taffeta) was disposed,

resin distribution medium 5 (polypropylene mesh material) was disposed so as to extend up to one end surface of the reinforcing fiber material laminate 4D, resin injection port 6o and evacuation ports 6a, 6b were disposed as shown in Fig. 11, the whole of these members was covered with bag material 8 (nylon film) by a double bag system, and the circumferential portion was sealed by sealant 7 made of a synthetic rubber having a high adhesive property. Valves B1, B2 were opened at a condition where valves A1, A2 were closed, and the pressure in the cavity was reduced down to 0.1 MPa or less by vacuum pump 11 through the vacuum line via vacuum trap 13.

Kindly replace the full paragraph on page 60 with the following:

Industrial Applications ~~of the Invention~~

~~The~~ Our method of RTM molding ~~according to the present invention~~ is suitable particularly for molding of a thick FRP structural material[[,]] and ~~according to the present invention,~~ an FRP structural material, having an excellent designability, or having excellent lightweight property and strength by increase of fiber volume content, can be molded.